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DRINKING WATER SURVEILLANCE PROGRAM

**HUNTSVILLE
WATER TREATMENT
PLANT**

REPORT FOR 1991 AND 1992

ISSN 1195-1281

**HUNTSVILLE WATER TREATMENT PLANT
DRINKING WATER SURVEILLANCE PROGRAM
REPORT FOR 1991 AND 1992**

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PIBS 2899

EXECUTIVE SUMMARY
DRINKING WATER SURVEILLANCE PROGRAM
HUNTSVILLE WATER TREATMENT PLANT
1992 REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

The Huntsville water treatment plant is a conventional treatment plant which treats water from Fairy Lake. The process consists of coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. Sodium carbonate is used to adjust the alkalinity and is also used for pH adjustment. This plant has a rated capacity of $9.0 \times 1000 \text{ m}^3/\text{day}$. The Huntsville water treatment plant serves a population of approximately 6,000.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

Table A is a summary of all results by group.

The health related guideline for lead was exceeded in one distribution system sample at one location. The District Officer was notified. Inadequate flushing and the fact that the sampling protocol was being demonstrated may have contributed to the elevated lead level.

No other known health related guidelines were exceeded.

The Huntsville water treatment plant, for the limited sampling period in 1992, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A ' ' ' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE		RAW		TREATED		TOWN HALL	
	TESTS	%POSITIVE	TESTS	%POSITIVE	TESTS	%POSITIVE	TESTS	%POSITIVE
BACTERIOLOGICAL	6	4	66	2	0	0	2	1
CHEMISTRY (FIELD)	6	6	100	12	10	83	10	9
CHEMISTRY (LABORATORY)	44	38	86	46	36	78	40	37
METALS	48	13	27	48	12	25	46	17
CHLOROPAROMATICS	28	0	0	28	0	0	28	0
PESTICIDES AND PCB	70	0	0	70	0	0	44	0
PHENOLICS	2	0	0	2	0	0	.	.
VOLATILES	62	4	6	62	6	9	62	6
RADIONUCLIDES	7	0	0	7	1	14	.	.
TOTAL	273	65	277	65	232	70		

DRINKING WATER SURVEILLANCE PROGRAM
HUNTSVILLE WATER TREATMENT PLANT
1992 REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Huntsville water treatment plant in November 1992.

PLANT DESCRIPTION

The Huntsville water treatment plant is a conventional treatment plant which treats water from Fairy Lake. The process consists of coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. Sodium carbonate is used to adjust the alkalinity and also for pH adjustment. This plant has a rated capacity of $9.0 \times 1000 \text{ m}^3/\text{day}$. The Huntsville water treatment plant serves a population of approximately 6,000.

The sample day flow for December 1992 was reported at $2.8 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Stringent DWSP sampling protocols were followed to ensure that all samples were collected in a uniform manner (see Appendix B).

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration.

Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

To obtain a representative raw water sample, free from any added chemicals, at plants which used chlorine for zebra mussel control, the operator was required to turn off the chlorine feed to the mouth of the intake and allow enough time for the chlorinated water to clear from the intake works.

Plant operating personnel routinely analyzed parameters for process control (Table 2).

At all distribution system locations, two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples, therefore, were laboratory chemistry and metals. The free flow sample represented fresh water from the distribution system main, since the sample tap was flushed for five minutes prior to sampling.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between the raw and treated water sampling, flow rate, and treatment chemicals dosages.

Table 4 is a summary of all results by parameter and by water type. If a parameter was not detected, the total number of negative sample results is given. In contrast, if a parameter was detected

at any location, the detailed results for all samples are provided. Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment and Energy laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 4 and 5. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

The guidelines are evaluated on the results from the free flowing samples. Standing samples in the distribution system can show elevated concentrations in certain metals if the water is corrosive or if the standing time is excessive. Flushing the tap until the water achieves the coolest temperature will ensure that the water used for consumption will contain minimum concentrations of metals.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- THE TREATED AND DISTRIBUTED WATER;
- ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE
GUIDELINE VALUES; AND
- POSITIVE ORGANIC PARAMETERS DETECTED.

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

The results of the field chemistry tests showed that none were above the available guidelines.

CHEMISTRY (LABORATORY)

Alkalinity was below the ODWO Recommended Operational Guideline of 30-500 mg/L in all 4 treated and distributed water samples ranging from 9.4 - 18.0 mg/L.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness was below the ODWO Recommended Operational Guideline of 80-100 mg/L in all 4 treated and distributed water samples ranging from 12.5 - 13.1 mg/L.

The Langelier's index lower than -2.0 for treated and distributed water samples indicates that the water is aggressive and has a tendency to be corrosive.

METALS

Lead exceeded the ODWO Maximum Acceptable Concentration of 10 ug/L in 1 of 4 treated and distributed water samples with a maximum reported value of 13.0 ug/L. The District Officer was notified. Inadequate flushing and the fact that the sampling protocol was being demonstrated may have contributed to the elevated lead level.

The very low Langelier's index would indicate the probable occurrence of elevated levels of lead and other metals in the standing samples. Household taps may need to be flushed, until the coolest water temperature is obtained, before water is used for consumption.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

Chlorophenols were not analyzed for the limited sampling period in 1992.

PESTICIDES AND PCB

The results of the pesticide and PCB scan showed that none were detected.

PHENOLICS

The results of the phenolics test showed that none were detected above trace levels.

POLYAROMATIC HYDROCARBONS

Polyaromatic hydrocarbons were not analyzed for the limited sampling period in 1992.

SPECIFIC PESTICIDES

Specific pesticides were not analyzed for the limited sampling period in 1992.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology. Trace levels of styrene are considered to be laboratory artifacts resulting from the sample shipping containers.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THM results are discussed. Starting in 1991, samples from the distribution system were quenched with sodium thiosulphate to stop the further production of THMs in the sample bottle. This provides a more representative estimation of the THMs consumed in tap water.

Total trihalomethanes were found at positive levels in all 4 treated and distributed water samples analyzed. The maximum observed level was 117.7 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

THMs were detected at positive levels in 2 raw water samples. Where prechlorination is practiced, the operator must ensure that no chlorine is present in the lowlift chamber and discharge line and

that the lowlift pumps are in operation for some time before the raw sample is taken.

RADIOLOGICAL

RADIONUCLIDES

There are more than 200 radionuclides, some of which occur naturally and others which originate from the activities of society. The radionuclides currently of greater interest from a health view-point are tritium, strontium-90, iodine-131, cesium-137 and radium-226. The gross beta and gross alpha determinations are suitable for preliminary screening except for tritium which must be measured separately. Radionuclides are measured in becquerels per litre (Bq/L). No results were above the available guidelines.

CONCLUSIONS

The health related guideline for lead was exceeded in one distribution system sample at one location. The District Officer was notified. Inadequate flushing and the fact that the sampling protocol was being demonstrated may have contributed to the elevated lead levels.

The very low Langelier's Index would indicate the probable occurrence of elevated levels of lead and other metals in the standing samples. Household taps may need to be flushed, until the coolest water temperature is obtained, before water is used for consumption.

No other known health related guidelines were exceeded.

The Huntsville water treatment plant, for the limited sampling period of 1992, produced good quality water and this was maintained in the distribution system.

FIGURE 1
HUNTSVILLE WATER TREATMENT PLANT

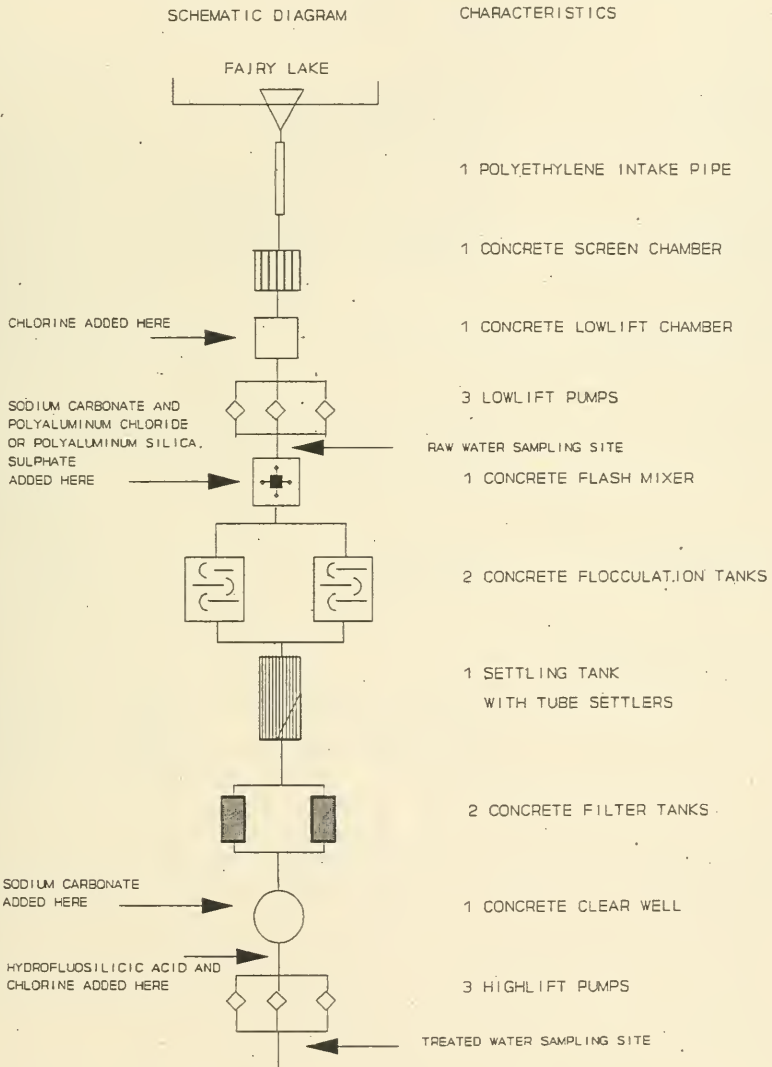


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

PLANT NAME: HUNTSVILLE WTP
WORKS #: 220002093
UTM #: 176397405021310

DISTRICT: MUSKOKA-HALIBURTON
REGION: CENTRAL
DISTRICT OFFICER: T. O'NEILL

SUPERINTENDENT: B. MCDONALD

ADDRESS: HIGHWAY 60 P. O. BOX 2700
HUNSTVILLE, ONTARIO
POA 1K0
705-789-8491

MUNICIPALITY: HUNTSVILLE
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	3.000	(X 1000 M3)
DESIGN CAPACITY:	9.000	(X 1000 M3/DAY)
RATED CAPACITY:	9.000	(X 1000 M3/DAY)

MUNICIPALITY

HUNTSVILLE

POPULATION

6,000

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER -----	LOCATION -----	FREQUENCY -----
FREE CHLORINE RESIDUAL	LAB TREATED TREATED	DAILY CONTINUOUS
FLUORIDE	LAB TREATED TREATED	DAILY CONTINUOUS
PH	MIXED SETTLED TREATED	CONTINUOUS CONTINUOUS CONTINUOUS
TEMPERATURE	RAW TREATED	CONTINUOUS CONTINUOUS
TURBIDITY	RAW TREATED	CONTINUOUS CONTINUOUS

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM HUNTSVILLE WTP SAMPLE DAY CONDITIONS
AND TREATMENT CHEMICAL DOSAGES FOR 1992

DATE	DELAY * TIME(HRS)	FLOW (1000M3)	PRE CHLORINATION CHLORINE	COAGULATION POLYALUMINUM CHLORIDE	COAGULATION POLYALUMINUM SILICA SULPHATE	ALKALINITY ADJUST SODIUM CARBONATE	FLUORIDATION HYDROFLUOSILICIC ACID	POST PH ADJUSTMENT SODIUM CARBONATE	POST CHLORINATION CHLORINE
92 NOV 03	.00	-	2.64	59.00	59.00	16.50	.89		0.53
92 DEC 08	.00	2.815	2.64	59.00		16.00	.86	8.40	0.58

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

KEY TO TABLE 4 and 5

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
 - 1+. MAC for Total Trihalomethanes
 2. Interim Maximum Acceptable Concentration (IMAC)
 3. Aesthetic Objective (AO)
 - 3*. AO for Total Xylenes
 4. Recommended Operational Guideline
 5. Health Related Guidance Value
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
 2. Proposed MAC
 3. Interim MAC
 4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
 2. Tentative GV
 3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
 2. Suggested No-Adverse Effect Level (SNAEL)
 3. Lifetime Health Advisory
 4. EPA Ambient Water Quality Criteria
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
 2. Aesthetic Guideline Level
 3. Maximum Admissable Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

. No Sample Taken

BDL Below Minimum Measurement Amount

<T Greater Than Detection Limit But Not Confident
(SEE INTERPRETATION OF RESULTS ABOVE)

> Results Are Greater Than The Upper Limit

<=> Approximate Result

!48 No Data: Sample Age Exceeded 48 Hours

!AR No Data: No Numeric Results

!AW No Data: Analysis Withdrawn

!BT No Data: Sample Broken In Transit

!CS No Data: Contamination Suspected

!EF No Data: Laboratory Equipment Failure

!IR No Data: Insufficient Sample

!IS No Data: Insufficient Sample

!LA No Data: Laboratory Accident

!NP No Data: No Procedure

!NR No Data: Sample Not Received

!OP No Data: Obscured Plate

!PE No Data: Procedure Error: Sample Discarded

!PR No Data: Preservative Required

!QU No Data: Quality Control Unacceptable

!RE No Data: Received Empty

!RO No Data: No Numeric Results

!SM No Data: Sample Missing

!SS No Data: Sample Improperly Preserved

!U No Data: Sample Unsuitable For Analysis

!UB No Data: Bottle Broken

!UN No Data: Result Unreliable

!UR	No Data: Unpreserved Sample Required
A	Approximate Value
A3C	Approximate, Total Count Exceeded 300 Colonies
A>	Approximate Value, Exceeded Normal Range
APS	Additional Peak, Less Than, Not Priority Pollutant
ARO	Additional Information In Laboratory Report
CRO	Calculated Result Only
NAF	Not All Required Tests Found
RID	Ioncal Calculated on Incomplete Data Set
RMP	P and M-Xylene Not Separated
RRR	Result Obtained by Repeat Analysis
RRV	Rerun Verification
SFA	Sample Filtered: Filtrate Analyzed
SIL	Sample Incorrectly Labelled
SPS	Several Peaks, Small, Not Priority Pollutant
U48	Unreliable: Sample Age Exceeded 48 Hours
UAL	Unreliable: Sample Age Exceeded Limit
UAU	Unreliable: Sample Age Unknown
UCS	Unreliable: Contamination Suspected
WSD	Wrong Sample Description On Bottle

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
BACTERIOLOGICAL			
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = 0 (A1)
2 SAMPLES			
	BOL		
STANDARD PLATE CNT MF (CT/ML)		DET'N LIMIT = 0	GUIDELINE = 500 (A3)
1992 NOV	.	2 <=>	96
1992 DEC	.	1 <=>	7 <=>
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = 5/100ML (A1)
1992 NOV	430 A3C	.	.
1992 DEC	190	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = N/A
1992 NOV	3900 A3C	.	.
1992 DEC	450	.	.

TABLE-4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW		
CHEMISTRY (FIELD)				
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
1992 NOV	.000		.050	
1992 DEC	.000		.000	
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
1992 NOV	1.100		.150	
1992 DEC	.960		.100	
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
1992 NOV	1.100		.200	
1992 DEC	.960		.100	
FLD PH (OMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5 (A4)
1992 NOV	6.530	6.840	6.800	
1992 DEC	6.900	7.210	6.900	
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)
1992 NOV	8.500	7.600	10.000	
1992 DEC	8.300	3.600	8.000	
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1.0 (A1)
1992 NOV	.850	.100		
1992 DEC	1.720	.040		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW		
			CHEMISTRY (LABORATORY)	
			ALKALINITY (MG/L)	DET'N LIMIT = 0.2
1992 NOV	6.900	9.400	9.700	GUIDELINE = 30-500 (A4)
1992 DEC	7.700	17.800	18.000	
			CALCIUM (MG/L)	DET'N LIMIT = 0.20
1992 NOV	3.400	3.500	3.650	GUIDELINE = 100 (F2)
1992 DEC	3.350	3.400	3.550	
			CYANIDE (MG/L)	DET'N LIMIT = 0.001
			2 SAMPLES	BDL
			CHLORIDE (MG/L)	DET'N LIMIT = 0.20
1992 NOV	3.700	7.400	7.500	GUIDELINE = 250 (A3)
1992 DEC	4.300	7.100	7.300	
			COLOUR (H2U)	DET'N LIMIT = 0.50
1992 NOV	33.500	2.000	5.000	GUIDELINE = 5 (A3)
1992 DEC	31.500	2.000	4.000	
			CONDUCTIVITY (UMHO/CM)	DET'N LIMIT = 1.0
1992 NOV	50	99	101	GUIDELINE = 400 (F2)
1992 DEC	56	111	112	
			DISS ORG CARBON (MG/L)	DET'N LIMIT = 0.10
1992 NOV	5.100	2.400	2.200	GUIDELINE = 5.0 (A3)
1992 DEC	5.000	2.400	2.300	
			FLUORIDE (MG/L)	DET'N LIMIT = 0.01
1992 NOV	.040 <T	1.020	.840	GUIDELINE = 1.5 (A1)
1992 DEC	.080	.860	.860	
			HARDNESS (MG/L)	DET'N LIMIT = 0.5
1992 NOV	12.600	12.600	13.100	GUIDELINE = 80-100 (A4)
1992 DEC	12.360	12.520	12.840	
			IONCAL (DMNS/LESS)	DET'N LIMIT = N/A
1992 NOV	3.049	2.847	2.070	GUIDELINE = N/A
1992 DEC	3.334	2.904	2.132	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
CHEMISTRY (LABORATORY)			
POTASSIUM (MG/L)		DET'N LIMIT = 0.01	GUIDELINE = 10 (F2)
1992 NOV	.607	.613	.648
1992 DEC	.592	.605	.605
LANGELIERS INDEX (DMMSLESS)			GUIDELINE = N/A
1992 NOV	-2.894	-2.720	-2.579
1992 DEC	-2.896	-2.191	-2.087
MAGNESIUM (MG/L)		DET'N LIMIT = 0.1	GUIDELINE = 30.0 (F2)
1992 NOV	.980	.960	.970
1992 DEC	.970	.980	.960
SODIUM (MG/L)		DET'N LIMIT = 0.20	GUIDELINE = 200 (A4)
1992 NOV	3.160	13.050	12.860
1992 DEC	4.730	16.870	16.750
AMMONIUM TOTAL (MG/L)		DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)
1992 NOV	.020	.010	.012
1992 DEC	.020	.004 <T	.008 <T
NITRITE (MG/L)		DET'N LIMIT = 0.001	GUIDELINE = 1.0 (A1)
1992 NOV	.004 <T	.001 <T	.002 <T
1992 DEC	.004 <T	BDL	.001 <T
NITRATE (TOTAL) (MG/L)		DET'N LIMIT = 0.005	GUIDELINE = 10.0 (A1)
1992 NOV	.185	.175	.170
1992 DEC	.200	.200	.200
NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02	GUIDELINE = N/A
1992 NOV	.290	.160	.130
1992 DEC	.270	.120	.120
PH (DMMSLESS)		DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5 (A4)
1992 NOV	7.070	7.120	7.230
1992 DEC	7.030	7.390	7.470
PHOSPHORUS FIL REACT (MG/L)		DET'N LIMIT = 0.0005	GUIDELINE = N/A
1992 NOV	.001 <T	.001 <T	.
1992 DEC	.001 <T	.001 <T	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
CHEMISTRY (LABORATORY)			
PHOSPHORUS TOTAL (MG/L)		DET'N LIMIT = 0.002	GUIDELINE = 0.40 (F2)
1992 NOV	.008 <T	BDL	
1992 DEC	.011	.009 <T	
RESIDUE FILTRATE (MG/L)			
		DET'N LIMIT = N/A	GUIDELINE = 500 (A3)
1992 NOV	32.400 CRO	64.600 CRO	
1992 DEC	36.600 CRO	72.000 CRO	
		73.000 CRO	
SULPHATE (MG/L)			
		DET'N LIMIT = 0.20	GUIDELINE = 500 (A3)
1992 NOV	7.760	19.470	
1992 DEC	9.390	19.270	
TURBIDITY (FTU)			
		DET'N LIMIT = 0.05	GUIDELINE = 1.0 (A1)
1992 NOV	1.740	.300	
1992 DEC	2.600	.190 <T	
		.780	
		.370	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	METALS		
SILVER (UG/L)			BDL	BDL	DET'N LIMIT = 0.05
6 SAMPLES			BDL	BDL	
ALUMINUM (UG/L)					DET'N LIMIT = 0.10
1992 NOV	330.000	18.000			
1992 DEC	520.000	27.000			
ARSENIC (UG/L)					DET'N LIMIT = 0.10
1992 NOV	.300 <T	.480 <T			
1992 DEC	.190 <T	.380 <T			
BARIUM (UG/L)					DET'N LIMIT = 0.05
1992 NOV	18.000	18.000			
1992 DEC	19.000	18.000			
BORON (UG/L)					DET'N LIMIT = 2.00
1992 NOV	6.500 <T	6.200 <T			
1992 DEC	6.900 <T	8.100 <T			
BERYLLIUM (UG/L)					DET'N LIMIT = 0.05
6 SAMPLES	BDL	BDL			
CADMIUM (UG/L)					DET'N LIMIT = 0.05
1992 NOV	BDL	BDL			
1992 DEC	.060 <T	.070 <T			
COBALT (UG/L)					DET'N LIMIT = 0.02
1992 NOV	.100 <T	.090 <T			
1992 DEC	.110 <T	.100 <T			
CHROMIUM (UG/L)					DET'N LIMIT = 0.50
1992 NOV	.580 <T	BDL			
1992 DEC	.540 <T	.840 <T			
COPPER (UG/L)					DET'N LIMIT = 0.50
1992 NOV	.650 <T	5.900			
1992 DEC	1.000 <T	3.300 <T			

GUIDELINE = N/A

GUIDELINE = 100 (A4)

GUIDELINE = 25 (A1)

GUIDELINE = 1000 (A2)

GUIDELINE = 5000 (A1)

GUIDELINE = 6800 (D4)

GUIDELINE = 5.0 (A1)

GUIDELINE = N/A

GUIDELINE = 50.0 (A1)

GUIDELINE = 1000 (A3)

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
METALS			
IRON (UG/L)		DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)
1992 NOV	180.000	10.000 <T	
1992 DEC	240.000	6.400 <T	
MERCURY (UG/L)		DET'N LIMIT = 0.02	GUIDELINE = 1.0 (A1)
4 SAMPLES	BOL	BOL	
MANGANESE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 50.0 (A3)
1992 NOV	24.000	1.600	2.600
1992 DEC	49.000	3.500	2.500
MOLYBDENUM (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = N/A
1992 NOV	.060 <T	.090 <T	BOL
1992 DEC	.060 <T	.080 <T	BOL
NICKEL (UG/L)		DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)
1992 NOV	.440 <T	.380 <T	.760 <T
1992 DEC	.790 <T	1.200 <T	1.700 <T
LEAD (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 10 (A1)
1992 NOV	.160 <T	.080 <T	13.000 RRV
1992 DEC	.160 <T	BOL	3.400
ANTIMONY (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)
1992 NOV	.360 <T	.310 <T	.470 <T
1992 DEC	.470 <T	.410 <T	.420 <T
SELENIUM (UG/L)		DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)
1992 NOV	BOL	1.700 <T	BOL
1992 DEC	BOL	BOL	BOL
STRONTIUM (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = N/A
1992 NOV	29.000	30.000	29.000
1992 DEC	30.000	29.000	29.000
TITANIUM (UG/L)		DET'N LIMIT = 0.50	GUIDELINE = N/A
1992 NOV	4.300 <T	3.500 <T	3.300 <T
1992 DEC	7.400	6.500	5.700

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
METALS			
THALLIUM (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 13 (D4)
6 SAMPLES	BDL	BDL	
URANIUM (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)
6 SAMPLES	BDL	BDL	
VANADIUM (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = N/A
1992 NOV	.150 <T	BDL	
1992 DEC	.170 <T	BDL	
ZINC (UG/L)		DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)
1992 NOV	7.100	4.500	
1992 DEC	9.900	6.100	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
CHLOROAROMATICS			
HEXACHLOROBUTADIENE (NG/L)	BDL	BDL	DET'N LIMIT = 1,000 GUIDELINE = 450 (D4)
6 SAMPLES	BDL	BDL	
123-TRICHLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 5,000 GUIDELINE = N/A
6 SAMPLES	BDL	BDL	
1234-TETChlorobenzene (NG/L)	BDL	BDL	DET'N LIMIT = 1,000 GUIDELINE = N/A
6 SAMPLES	BDL	BDL	
1235-TETChlorobenzene (NG/L)	BDL	BDL	DET'N LIMIT = 1,000 GUIDELINE = N/A
6 SAMPLES	BDL	BDL	
124-TRICHLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 5,000 GUIDELINE = 10000 (I)
6 SAMPLES	BDL	BDL	
1245-TETChlorobenzene (NG/L)	BDL	BDL	DET'N LIMIT = 1,000 GUIDELINE = 38000 (D4)
6 SAMPLES	BDL	BDL	
135-TRICHLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 5,000 GUIDELINE = N/A
6 SAMPLES	BDL	BDL	
HEXACHLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 1,000 GUIDELINE = 10 (C1)
6 SAMPLES	BDL	BDL	
HEXACHLOROETHANE (NG/L)	BDL	BDL	DET'N LIMIT = 1,000 GUIDELINE = 1900 (D4)
1992 NOV	BDL	BDL	
1992 DEC	1,000 <T	BDL	
OCTACHLOROSTYRENE (NG/L)	BDL	BDL	DET'N LIMIT = 1,000 GUIDELINE = N/A
6 SAMPLES	BDL	BDL	
PENTACHLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 1,000 GUIDELINE = 74000 (D4)
6 SAMPLES	BDL	BDL	
236-TRICHLOROTOLUENE (NG/L)	BDL	BDL	DET'N LIMIT = 5,000 GUIDELINE = N/A
6 SAMPLES	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
CHLOROAROMATICS			
245-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000	GUIDELINE = N/A
6 SAMPLES	BDL	BDL	
26A-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000	GUIDELINE = N/A
6 SAMPLES	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
PESTICIDES AND PCB			
ALDRIN (NG/L)		DET'N LIMIT = 1.000	GUIDELINE = 700 (A1)
6 SAMPLES	BDL	BDL	
ALPHA BHC (NG/L)		DET'N LIMIT = 1.000	GUIDELINE = 700 (G)
1992 NOV	BDL	BDL	
1992 DEC	1.000 <T	1.000 <T	
BETA BHC (NG/L)		DET'N LIMIT = 1.00	GUIDELINE = 300 (G)
6 SAMPLES	BDL	BDL	
LINDANE (GAMMA BHC) (NG/L)		DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)
6 SAMPLES	BDL	BDL	
ALPHA CHLORDANE (NG/L)		DET'N LIMIT = 2.000	GUIDELINE = 7000 (A1)
6 SAMPLES	BDL	BDL	
GAMMA CHLORDANE (NG/L)		DET'N LIMIT = 2.00	GUIDELINE = 7000 (A1)
6 SAMPLES	BDL	BDL	
DIELDRIN (NG/L)		DET'N LIMIT = 2.00	GUIDELINE = 700 (A1)
6 SAMPLES	BDL	BDL	
METHOXYCHLOR (NG/L)		DET'N LIMIT = 5.0	GUIDELINE = 900000 (A1)
6 SAMPLES	BDL	BDL	
ENDOSULFAN I (NG/L)		DET'N LIMIT = 2.00	GUIDELINE = 74000 (D4)
6 SAMPLES	BDL	BDL	
ENDOSULFAN II (NG/L)		DET'N LIMIT = 5.000	GUIDELINE = 74000 (D4)
6 SAMPLES	BDL	BDL	
ENDRIN (NG/L)		DET'N LIMIT = 5.000	GUIDELINE = 1600 (D3)
6 SAMPLES	BDL	BDL	
ENDOSULFAN SULPHATE (NG/L)		DET'N LIMIT = 5.00	GUIDELINE = N/A
6 SAMPLES	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
PESTICIDES AND PCB			
HEPTACHLOR EPOXIDE (NG/L)			GUIDELINE = 3000 (A1)
6 SAMPLES	BDL	BDL	
HEPTACHLOR (NG/L)			GUIDELINE = 3000 (A1)
6 SAMPLES	BDL	BDL	
MIREX (NG/L)			GUIDELINE = N/A
6 SAMPLES	BDL	BDL	
OXYCHLORANE (NG/L)			GUIDELINE = N/A
6 SAMPLES	BDL	BDL	
O,P-DDT (NG/L)			GUIDELINE = 30000 (A1)
6 SAMPLES	BDL	BDL	
PCB (NG/L)			GUIDELINE = 3000 (A2)
6 SAMPLES	BDL	BDL	
P,P-DDD (NG/L)			GUIDELINE = 30000 (A1)
6 SAMPLES	BDL	BDL	
P,P-DDE (NG/L)			GUIDELINE = 30000 (A1)
6 SAMPLES	BDL	BDL	
P,P-DDT (NG/L)			GUIDELINE = 30000 (A1)
6 SAMPLES	BDL	BDL	
TOXAPHENE (NG/L)			GUIDELINE = 5000 (A1)
6 SAMPLES	BDL	BDL	
AMETRINE (NG/L)			GUIDELINE = 300000 (D3)
4 SAMPLES	BDL	BDL	
ATRAZINE (NG/L)			GUIDELINE = 60000 (A2)
4 SAMPLES	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
PESTICIDES AND PCB			
ATRAZONE (NG/L)		DET'N LIMIT = 50.0	GUIDELINE = N/A
4 SAMPLES	BDL	BDL	
CYANAZINE (BLADEX) (NG/L)		DET'N LIMIT = 100.0	GUIDELINE = 10000 (A2)
4 SAMPLES	BDL	BDL	
DESETHYL ATRAZONE (NG/L)		DET'N LIMIT = 200.0	GUIDELINE = 60000 (A2)
4 SAMPLES	BDL	BDL	
DESETHYL SIMAZINE (NG/L)		DET'N LIMIT = 200.0	GUIDELINE = 10000 (A2)
4 SAMPLES	BDL	BDL	
PROMETONE (NG/L)		DET'N LIMIT = 50.000	GUIDELINE = 52500 (D3)
4 SAMPLES	BDL	BDL	
PROPACINE (NG/L)		DET'N LIMIT = 50.000	GUIDELINE = 700000 (D3)
4 SAMPLES	BDL	BDL	
PROMETRYNE (NG/L)		DET'N LIMIT = 50.000	GUIDELINE = 1000 (A2)
4 SAMPLES	BDL	BDL	
METRIBUZIN (SENGOR) (NG/L)		DET'N LIMIT = 100.0	GUIDELINE = 80000 (A1)
4 SAMPLES	BDL	BDL	
SIMAZINE (NG/L)		DET'N LIMIT = 50.00	GUIDELINE = 10000 (A2)
4 SAMPLES	BDL	BDL	
ALACHLOR (LASSO) (NG/L)		DET'N LIMIT = 500.0	GUIDELINE = 5000 (A2)
4 SAMPLES	BDL	BDL	
METOLACHLOR (NG/L)		DET'N LIMIT = 500.0	GUIDELINE = 50000 (A2)
4 SAMPLES	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	DET'N LIMIT =	GUIDELINE =
PHENOLICS				
1992 NOV	.800 <T	BDL	0.2	N/A
1992 DEC	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
VOLATILES			
BENZENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
6 SAMPLES	BDL	BDL	
TOLUENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)
6 SAMPLES	BDL	BDL	
ETHYLBENZENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)
1992 NOV	BDL	.100 <T	
1992 DEC	.100 <T	.100 <T	
P-XYLENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)
6 SAMPLES	BDL	BDL	
M-XYLENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)
6 SAMPLES	BDL	BDL	
O-XYLENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)
6 SAMPLES	BDL	BDL	
STYRENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)
1992 NOV	BDL	BDL	
1992 DEC	.150 <T	.150 <T	
1,1-DICHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.100	GUIDELINE = 7 (D1)
6 SAMPLES	BDL	BDL	
METHYLENE CHLORIDE (UG/L)		DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)
6 SAMPLES	BDL	BDL	
1,1,2-DICHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 70 (D1)
6 SAMPLES	BDL	BDL	
1,1-DICHLOROETHANE (UG/L)		DET'N LIMIT = 0.100	GUIDELINE = N/A
6 SAMPLES	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW		
VOLATILES				
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
1992 NOV	7.900	115.500	100.100	
1992 DEC	16.000	108.000	80.800	
111, TRICHLOROETHANE (UG/L)				
			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)
6 SAMPLES	BDL	BDL	BDL	
1,2-DICHLOROETHANE (UG/L)				
			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
6 SAMPLES	BDL	BDL	BDL	
CARBON TETRACHLORIDE (UG/L)				
			DET'N LIMIT = 0.20	GUIDELINE = 5 (A1)
6 SAMPLES	BDL	BDL	BDL	
1,2-DICHLOROPROPANE (UG/L)				
			DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)
6 SAMPLES	BDL	BDL	BDL	
TRICHLOROETHYLENE (UG/L)				
			DET'N LIMIT = 0.10	GUIDELINE = 50 (A1)
6 SAMPLES	BDL	BDL	BDL	
DICHLOROBROMOMETHANE (UG/L)				
			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)
1992 NOV	BDL	2.200	1.850	
1992 DEC	.300 <T	2.250	1.550	
112-TRICHLOROETHANE (UG/L)				
			DET'N LIMIT = 0.05	GUIDELINE = 0.6 (D4)
6 SAMPLES	BDL	BDL	BDL	
CHLORODIBROMOMETHANE (UG/L)				
			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
6 SAMPLES	BDL	BDL	BDL	
TETRACHLOROETHYLENE (UG/L)				
			DET'N LIMIT = 0.05	GUIDELINE = 65 (A5)
6 SAMPLES	BDL	BDL	BDL	
BROMOFORM (UG/L)				
			DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)
6 SAMPLES	BDL	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
VOLATILES			
1122-TETRACHLOROETHANE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 0.17 (D4)
6 SAMPLES	BDL	BDL	BDL
VINYL CHLORIDE (UG/L)		DET'N LIMIT = 0.100	GUIDELINE = 2 (D1)
6 SAMPLES	BDL	BDL	BDL
C12-DICHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.100	GUIDELINE = 70 (D1)
6 SAMPLES	BDL	BDL	BDL
CHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 1510 (D3)
6 SAMPLES	BDL	BDL	BDL
1,4-DICHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 5 (A1)
6 SAMPLES	BDL	BDL	BDL
1,3-DICHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 3750 (D3)
6 SAMPLES	BDL	BDL	BDL
1,2-DICHLOROBENZENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 200 (A1)
6 SAMPLES	BDL	BDL	BDL
ETHYLENE DIBROMIDE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 50 (D1)
6 SAMPLES	BDL	BDL	BDL
TOTL TRIHALOMETHANES (UG/L.)		DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)
1992 NOV	7.900	117.700	101.950
1992 DEC	16.300	110.250	82.350

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1992 HUNTSVILLE WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM TOWN HALL FREE FLOW	
RADIONUCLIDES			
COBALT 60 (Bq/L)		DET'N LIMIT = 0.70	GUIDELINE = N/A
2 SAMPLES	BDL	BDL	
CESIUM 134 (Bq/L)		DET'N LIMIT = 0.70	GUIDELINE = N/A
2 SAMPLES	BDL	BDL	
CESIUM 137 (Bq/L)		DET'N LIMIT = 0.70	GUIDELINE = 50 (A1)
2 SAMPLES	BDL	BDL	
GROSS ALPHA COUNT (Bq/L)		DET'N LIMIT = 0.04	GUIDELINE = 0.55 (D1)
2 SAMPLES	BDL	BDL	
GROSS BETA COUNT (Bq/L)		DET'N LIMIT = 0.04	GUIDELINE = N/A
2 SAMPLES	BDL	BDL	
TRITIUM (Bq/L)		DET'N LIMIT = 7.00	GUIDELINE = 40000 (A1)
1992 DEC	BDL	6.000	
IODINE 131 (Bq/L)		DET'N LIMIT = 0.70	GUIDELINE = 10 (A1)
2 SAMPLES	BDL	BDL	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A4)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.20	30-500 (A4)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.20	100.0 (F2)
CHLORIDE	MG/L	0.20	250.0 (A3)
COLOUR	TCU	0.50	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.00	400.0 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.10	5.0 (A3)
FLUORIDE	MG/L	0.01	1.5* (A1)
HARDNESS	MG/L	0.50	80-100 (A4)
IONCAL	DMNSLESS	N/A	N/A
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.10	30.0 (F2)
NITRATES (TOTAL)	MG/L	0.005	10.0 (A1)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
POTASSIUM	MG/L	0.010	10.0 (F2)
RESIDUE FILTRATE (CALCULATED TDS)	MG/L	N/A	500.0 (A3)
SODIUM	MG/L	0.20	200.0 (A4)
SULPHATE	MG/L	0.20	500.0 (A4)
TURBIDITY	FTU	0.05	1.0 (A1)
* The Maximum Acceptable Concentration (MAC) for <u>naturally occurring fluoride</u> in drinking water is 2.4 mg/L.			
CHLOROAROMATICS			
1,2,3-TRICHLOROBENZENE	NG/L	5.0	N/A
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,4-TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.0	N/A
2,3,6-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,6A-TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE (HCB)	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
2,3,4-TRICHLOROPHENOL	NG/L	100.0	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	20.0	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
2,4,5-TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	N/A
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
POLYNUCLEAR AROMATIC HYDROCARBONS			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DESETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
LINDANE (GAMMA, BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	30000 (A1)
O,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDE	NG/L	1.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
DESETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	N/A
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.0	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.0	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.0	100000 (A1)
2,4-DICHLOROPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.0	N/A
2,4,5-TP (SILVEX)	NG/L	20.0	10000 (A1)
BUTYLATE (SUTAN)	NG/L	2000.0	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.0	90000 (A1)
CARBOFURAN	NG/L	2000.0	90000 (A1)
CHLOROPROPHAM (CIPC)	NG/L	2000.0	350000 (G)
CHLORPYRIFOS (DURSABAN)	NG/L	20.0	N/A
DIALLATE	NG/L	2000.0	N/A
DIAZINON	NG/L	20.0	20000 (A1)
DICAMBA	NG/L	50.0	120000 (A1)
DICHLOROVOS	NG/L	20.0	N/A
EPTAM	NG/L	2000.0	N/A
ETHION	NG/L	20.0	35000 (G)
IPC	NG/L	2000.0	N/A
MALATHION	NG/L	20.0	190000 (A1)
METHYL PARATHION	NG/L	50.0	9000 (D3)
METHYLTRITHION	NG/L	20.0	N/A
MEVINPHOS	NG/L	20.0	N/A
PARATHION	NG/L	20.0	50000 (A1)
PHORATE (THIMET)	NG/L	20.0	2000 (A2)
PICHLORAM	NG/L	100.0	190000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.0	140000 (D3)
RELDAN	NG/L	20.0	N/A
RONNEL	NG/L	20.0	N/A
VOLATILES			
1,1-DICHLOROETHANE	UG/L	0.10	N/A
1,1-DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2-DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2-DICHLOROETHANE	UG/L	0.05	5 (A1)
1,2-DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3-DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4-DICHLOROBENZENE	UG/L	0.10	5 (A1)
1,1,1-TRICHLOROETHANE	UG/L	0.02	200 (D1)
1,1,2-TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1,1,2,2-TETRACHLOROETHANE	UG/L	0.05	0.17 (D4)

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
CIS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	65 (A5)
TRANS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)
VINYL CHLORIDE	UG/L	0.10	2 (D1)
RADIONUCLIDES			
TRITIUM	BQ/L	7.0	40000 (A1)
GROSS ALPHA COUNT	BQ/L	0.04	0.55# (D1)
GROSS BETA COUNT	BQ/L	0.04	N/A
COBALT 60	BQ/L	0.70	N/A
CESIUM 134	BQ/L	0.70	N/A
CESIUM 137	BQ/L	0.70	50 (A1)
IODINE 131	BQ/L	0.70	10 (A1)

Equal to 15.0 Picocuries/litre

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1992, 109 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment and Energy (MOEE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOEE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOEE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg.
 - raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOEE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOEE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOEE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOEE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

PARAMETER REFERENCE INFORMATION

NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 $\mu g/L$

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27)
CYCLOHEXATRIENE (41)

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NONPOLAR LIQUID, OF
HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN
WITH SMOKING FLAME (30)

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41)
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS
AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT
A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES,
SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM
SOILS OR ARE DEGRADED RATHER QUICKLY (80)

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR
DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES;
COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER
COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND
RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING
AGENT; GASOLINE.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING
BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION
WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION,
COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION,
OXIDATION

ADDITIONAL PROPERTIES: MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27)
BOILING POINT: 80.1°C (27)
SPECIFIC GRAVITY: 0.8790 AT 20°C (27)
VAPOUR PRESSURE: 100 MM AT 26.1°C (27)
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41)
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39)
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Specific Pesticides (OWCP), (PEOP), (PEGAR)	-as per Organics -three extra bottles must be filled
Polyaromatic hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate
Cyanide (Treated only)	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)

Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year) (PBVOL), (PBEXT)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.
6. No smoking in area of sample location.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.

5. Fill general chemistry and metals bottles.

6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (Caution: HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Polyaromatic Hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate

Steps:

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

